HYDRAULIC DASHPOT FOR MOTOR VEHICLES

The present invention concerns a variable dashpot for motor vehicles as recited in the preamble to Claim 1.

Dashpots are manufactured variable to allow driving to be adapted to varying road conditions. Extra variable bypasses are for this purpose associated with the flow-control valves in the device's piston. Control is usually exerted by electronic programs in accordance with such parameters as speed, steering-wheel state, and running dynamics. To ensure particularly fine tuning, the bypass must feature at least two mutually dependently controlled channels.

Bypass systems of this genus are known from German 4 020 045 C1 and German 19 836 288 A1. There is a drawback to these bypasses, which have at least two channels, in that the channel can only be opened and closed sequentially. This can be done incrementally as disclosed in 4 020 045 C1 or continuously as disclosed in 19 836 288 A1.

The object of the present invention is to improve a hydraulic dashpot of the aforesaid genus to the extent that the at least two bypass channels, although they can be opened and closed mutually dependently, need not be opened and closed sequentially.

This object is attained in accordance with the present invention in a hydraulic dashpot of the aforesaid genus by the characteristics recited in Claim 1. Claims 2 through 4 address practical alternative and advanced embodiments.

The dashpot in accordance with the present invention has several advantages, especially in that the widths of the bypass and the widths of the channels can be varied to obtain almost any desired performance curve even though the individual channels are controlled by only one set of controls and hence only by way of a single drive mechanism associated with the controls.

Although using a slide provided with a variable breach to control a bypass is known from German 10 040 518, no one of skill in the art would derive from that document any intimation as to employing such a slide to control more than one such bypass.

One embodiment of the present invention will now be specified with reference to the accompanying drawing, wherein

Figure 1 is a longitudinal section through a dashpot in the vicinity of its piston

and

Figure 2 is a lateral view of the slide in particular.

As will be evident from Figure 1, the dashpot is provided with a cylinder 1, the inside of which is partitioned into two compartments 3 and 4 by a primary piston 2. Piston 2 is conventionally provided with strictly schematically depicted valves 5 and is fastened by unillustrated fasteners to a neck 6 that extends out of a bypass housing 7. Housing 7 is furthermore secured to a piston rod 8.

Mounted in housing 7 and hydraulically accommodated in a bypass is a secondary piston 9, with bore 10 extending through its center. Bore 10 communicates further with a beaker-shaped hollow 11 that also accommodates secondary piston 9 and opens into an outlet 12. Outlet 12 opens into upper compartment 3 through a port 13 in the wall of housing 7.

Accommodated transverse to outlet 12 is a slide 14. Slide 14 travels back and forth subject to s schematically represented magnet 15.

As will be evident from Figure 2, slide 14 is provided with a flow-control breach 16 that varies the open cross-section of outlet 12.

Another bypass hydraulically parallels the first. The second bypass is in the form of a bore 17 that extends above and

parallels outlet 12. It can also open into another bore 18 that opens in turn into the lower region of hollow 11, where it communicates directly with bore 10. The second bypass is accordingly not influenced by secondary piston 9.

In the vicinity of the horizontal bore 17 through the second bypass, slide 14 is provided with a flow-control breach 19 in the form of a slot. The breaches 16 and 19 in the illustrated embodiment are identical in structure. When, accordingly, magnet 15 is activated, attracting slide 14 upward, both breaches will open. Other forms of control are also possible. When, for example, magnet 15 is "off" as illustrated in Figures 1 and 2, flow-control breach 19 can be level with bore 17, whereby the second bypass will be open and outlet 12 blocked by slide 14 as illustrated. In this system, when magnet 15 is activated, bore 17 will be blocked, and flow-control breach 16 will gradually open outlet 12 as slide 14 lifts.

The two bypasses in another embodiment of the present invention can be adjacent and equal in cross-section. The flow in this version can be controlled by suddenly opening and then narrowing one bypass while gradually opening the other. In this event, the bypasses would be widest open while slide 14 was half-way along its stroke.